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Standard Practice for Comparative Evaluation of the Imaging Properties of Dry Electrostatic Toners¹

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INTRODUCTION

This practice is a pragmatic test for the user who can obtain meaningful results without the need for sophisticated instrumentation.

1. Scope

1.1 This practice covers a method of testing by which the user can prepare a test for dry electrostatic toners used in copiers, which has significance to their specific copying needs and suggests ways in which test prints may be made and used for each evaluation.

1.2 Additional evaluation of image characteristics are covered in Practice F 807 and Test Method F 875.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* See Section 8 for specific hazards statements.

2. Referenced Documents

2.1 ASTM Standards:²

F 335 Terminology Relating to Electrostatic Copying

F 360 Practice for Image Evaluation of Electrostatic Business Copies

F 470 Practice for Caking Temperature of Dry Electrostatic Toner

F 807 Practice for Determining Resolution Capability of Office Copiers

F 875 Test Method for Evaluation of Large Area Density and Background on Office Copiers

¹ This practice is under the jurisdiction of ASTM Committee F05 on Business Copy Products, and is the direct responsibility of Subcommittee F05.04 on Electrostatic Copy Products.

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² *Annual Book of ASTM Standards*, Vol 15.09.

For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

3.1 *Definitions:* Refer to Terminology F 335.

4. Summary of Practice

4.1 This practice involves the comparative evaluation of one or more toner supplies by subjectively rating a number of significant characteristics of imaged copies made under controlled conditions on a dry toner electrostatic copier.

5. Significance and Use

5.1 Subjective comparative evaluation of copies made from the same test original (or originals) can be used to determine the usefulness of a given dry toner supply in a specific user application.

6. Interferences

6.1 Many copy systems are subject to variations due to fluctuation of line voltage. It is conceivable that such fluctuations may cause a normally useful system to give poor results. It is recommended that a stable and dedicated electrical line be used for testing purposes or the manufacturer of the equipment should be consulted regarding the need for voltage-stabilizing devices, which can usually be installed easily.

6.2 Results from a copy system can vary, depending upon the length of time the system has been operating. The first print after a system has been shut down for a prolonged time period can be of different quality than subsequent imaged copies made after some time of operation.

6.3 Variations in copy system performance after continuous copying over relatively long periods, for example several hours or more, can occur. It is recommended that the test procedure be repeated if significant variation in the copy system performance occurs.

6.4 Variations in copy system performance can occur as a result of copier adjustments, for example, before and after service calls.

6.5 Excessively high or low relative humidity can also cause variation in performance not encountered under normal conditions.

6.6 All tests should be conducted in the same copier, during the same relative time period and environmental conditions.

6.7 Dry toner supplies are often purchasable from several sources and can affect the results of a given copy system. If the sample of dry toner selected shows evidence of caking (see Practice F 470) which cannot be easily broken up with a soft brush, it should be rejected and another sample used.

6.8 Paper supplies can be purchased from several sources and also can affect results of a given copy system. The user should use only the grade and weight of paper recommended by the copier manufacturer when evaluating one or more dry toner supplies. All paper supplies utilized should be from the same manufacturing source, and the user should try to use all paper supplies from the same production number (provided one is listed). Some inherent variability within the paper may affect image quality evaluation as will certain unintentional paper defects. Some variability may be encountered from one roll to the next or from one package of sheets to a second package, and sometimes within a package.

6.9 Variations in toner concentration in those copiers where mechanical adjustment of toner flow rate is available strongly affect copy quality and should be minimized to the extent made available by the mechanics of the copy system.

7. Apparatus

7.1 This practice requires the use of a specifically designed vacuum cleaner suitable to removing every speck of toner and carrier from bond copying equipment which requires high-powered cleaning.³

8. Hazards

8.1 This practice is intended to orient the user toward observing meaningful and significant characteristics of imaged copies obtained from a limited number of imaged copies. It does not encompass those defects which the user should be aware of such as deterioration, abrasion or scratching, or other adverse actions which could reduce the effectiveness of the operation of the copier with the test toner supplies. The manufacturer of the test toner supplies should be consulted prior to the evaluation of the supplies in order to ascertain what long-term functional testing (including compatability results with the copier and current reference toner supplies used by the user) has been performed by the test toner supplier on that particular model copier the user possesses. The manufacturer of the copier should also be contacted prior to any test should any question of consequential damages to the copier be involved.

8.2 Many dry toner copier manufacturers require that only trained service people should be permitted access to specific internal copier components. Prior to any testing, the manufacturer of the copier should be consulted as to which components or copier areas, or both (if any), the consumer may have access

to for visual evaluation of toner build-up and use of the vacuum cleaner. It may be necessary for the user to require the copier manufacturer's service people to perform all necessary component clean-up. Should this step be required, the user should be present to observe and record all observations regarding this maintenance step.

9. Sampling

9.1 Sampling is not applicable to this practice.

10. Procedure

10.1 Before beginning this practice comparison, read, understand, and follow the manufacturer's instructions on the operation of the copier. The toner being evaluated is best tested in a copy system at the site of its proposed installation under the line voltage conditions that would normally apply. The test target should be prepared as described in Practice F 360, Section 6.

10.2 Clean the copier using the vacuum cleaner. Refer to 8.1 and 8.2. Cleaning should encompass all transport systems, corona wires (using a recommended brush), the developer unit, etc. Follow all of the copier manufacturer's instructions pertaining to cleaning and maintenance.

10.3 Once the copier and toner developer system is visually clean and reassembled into the copier, the user should image several copies using any test target. If an image or any extraneous toner deposits are visible on either the front or back sides, repeat 10.2 and 10.3 until the imaged copies show no images.

10.4 Load the reference supplies into the copier. Follow the manufacturer's directions for adjustments of the various controls, if any are present.

10.5 Turn on the copier and if required, allow several minutes for warm-up.

10.6 Set the exposure control, if one is provided, to either end of the exposure range.

10.7 Using the prepared test target, make a copy. Record the exposure setting, time (if desired), and date on the copy.

10.8 Image copies at various exposure settings. Record the setting, time, environmental conditions, sequence number, and date on each copy. The operator each time should move the exposure setting in the same direction on the exposure control device when preparing a sequence of imaged copies. The starting point on the exposure control device should always be at the same point for each set of copies.

10.9 Determine the copier setting that, in your opinion, is the one yielding the best appearing copy. This is referred to as the "optimum copy."

10.10 At this optimum setting, image the number of copies that would constitute a normal length of run. This will allow comparison of toner uniformity as well as the toner replenishment system. Place or set the test original into the copier in the same orientation each time.

10.11 At the optimum setting, reverse the orientation of the test subject placed or set into the copier and make a copy. This copy can then be compared to previous copies to determine the effect of subject orientation variations. Record all pertinent information on this copy such as exposure setting, time, date, and test target orientation for possible future reference.

³ A Copy Vac Model 999-21 Dry Vacuum Cleaner is available from Copylite Products, 2890 Griffin Road, Fort Lauderdale, FL 33312.